UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,932	07/07/2003	Woo Chan Kim	2080-3-177	9201

7590 03/08/2007 Jonathan Y. Kang, Esq. Lee & Hong P.C. 14th Floor 801 South Figueroa Street Los Angeles, CA 90017	**EXAMINER** DSOUZA, JOSEPH FRANCIS A

ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	**Applicant(s)**
Office Action Summary	10/614,932	KIM, WOO CHAN
	Examiner	**Art Unit**	
	Adolf DSouza	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 November 2006</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1 - 11</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1 - 11</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>07 July 2003</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

Response to Arguments

1. The Examiner has accepted Applicant's response to the objection of claim 1.

2. Applicant requested if the drawings submitted were accepted. Examiner suggests changing "Related Art" in the drawings to "Prior Art".

3. Applicant's arguments filed 11/30/2006 have been fully considered but they are not persuasive.

Argument: Applicant has stated, "The Action implies that the output of summing unit 460 provides a difference between the output of summing unit 470 and the output of noise predictor 450. As annotated Fig. 4 clearly demonstrates, it is impossible for unit 470 to function in the manner alleged" (Remarks, page 7, last paragraph onwards).

Response: Examiner respectfully disagrees. As noted in the Office Action (8/31/2006, page 3, middle of page, 5 lines starting with "Sweitzer does not explicitly state ..." onwards, Sweitzer did not explicitly state what the error signal is. Examiner is providing a copy of Sweitzer, Figure 4 (page 5 of this Office Action) which has the signals at, various points marked in them:

Output of equalizer 410: Signal + Noise (S + N)

Output of noise predictor 450: P

Output of subtractor 430: S + N − P

Output of quantizer 420: S

Output of subtractor 460: N − P

Output of subtractor 470: N

Examiner would like to draw the similarity between the Applicant's Figure 6A and

Sweitzer's Figure 4 in the following manner:

Referring to Fig 6A of the Applicant's invention, the extracted noise signal is the output

of the filtering part 104, which basically tries to predict the noise so that it can be

subtracted out in subtractor 103. This function is similar to the noise predictor function in

Sweitzer's Figure 4 which produces the signal "P".

Referring to Fig 6A of the Applicant's invention, the reference error signal is the

difference between the equalized input signal (S + N) and the deciding part (slicer) 105.

The output of the slicer is "S" which is the desired symbol. Therefore the difference

between the two, which is the reference error signal, is N. This same signal is obtained

as the output of subtractor 470 in Sweitzer's Figure 4.

So, as can be seen from the various signals above, the output of subtractor 460 = N −

P, with N being the reference signal and P being the extracted noise signal. From the

above mathematical operations for deriving the signals, Examiner contends that the

output of subtractor 460 is the difference between the reference error signal and the

extracted noise signal.

From the above, it is also clear that for an output to be the difference between two signals, the inputs don't necessarily have to be those two signals. As another example, if an output X is calculated as $X = Y - Z$, then providing as inputs $(Y + A)$ and $(Z + A)$ or $(Y - Z + B)$ and B would all result in $X = Y - Z$.

Argument Applicant has stated, "Yet another distinction between claim 1 and Sweitzer relates to the claimed "(b) calculating a reference error signal that is a difference between the equalized signal and the signal having the noise removed therefrom." Page 3 of the Action indicated that this claim element is taught by summing unit 470 of Sweitzer (Remarks, page 10, 1st paragraph).

Response: As described above, the reference signal in the Applicant's invention corresponds to signal "N" in Sweitzer's Figure 4.
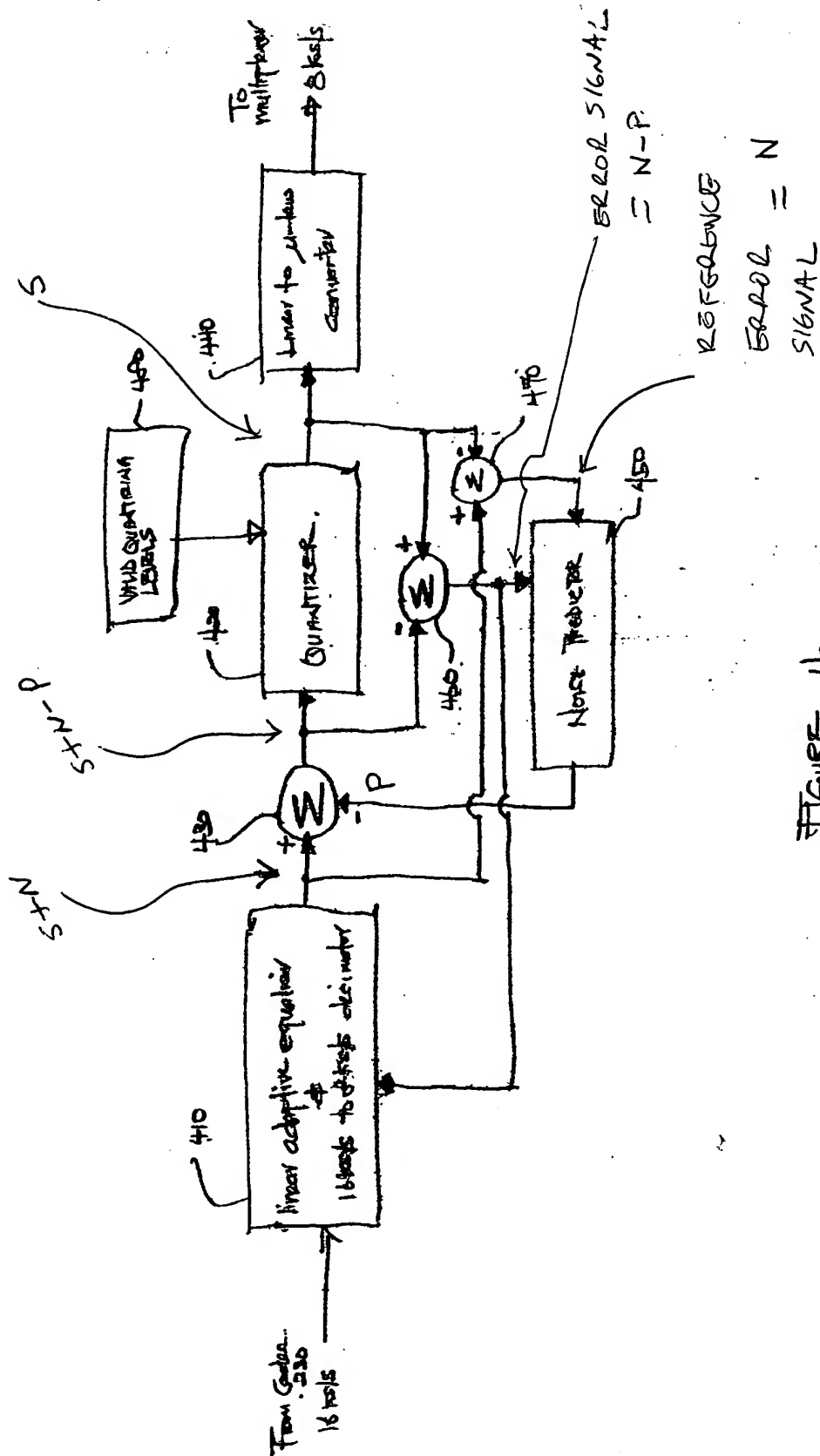
OOO

FIGURE 4

From Gordon 330
16 k/s/s

410 linear adaptive equation
16 k/s/s to 8 k/s/s decimator

S+N

430 W
+ / -

P

S+N-P

430 W
+ / -

Quantizer

Valid Quantum Levels 450

420

440 Linear to u-law converter

To multiplexer
→ 8 k/s/s

S

440 W
+ / -

460 W
+ / -

Noise Predictor 450

470

ERROR SIGNAL
= N-P

REFERENCE
ERROR = N
SIGNAL

Priority

4.   Acknowledgment is made of applicant's claim for foreign priority under 35

U.S.C. 119(a)-(d).

Drawings

5.   Figures 1 - 3 should be designated by a legend such as --Prior Art-- because

only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. The replacement sheet(s) should be labeled

"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

any portion of the drawing figures. If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office

action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 1 - 7, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over
Applicant's admitted prior art in view of Sweitzer et al. (US 20020072879).

Regarding claim 1, Applicant's admitted prior art discloses a VSB reception system (Fig.
1) comprising:

a demodulating part for receiving, converting, and demodulating a signal (Fig. 1);

a frequency domain equalizing part for equalizing the demodulated signal for removing
a distorted component from the demodulated signal (Fig. 1);

Applicant's admitted prior art does not disclose a noise removal circuit.

In the same field of endeavor Sweitzer discloses a noise removing part (Fig. 4) for (a)
receiving the equalized signal (Fig. 4, output of element 410; page 6, paragraph 70), (b)
calculating a reference error signal that is a difference between the equalized signal and
the signal having the noise removed there from (Fig. 4, output of element 470; page 7,
paragraph 73, 1st 4 lines), (c) calculating an error signal that is a difference between the
reference error signal and the extracted noise signal (Fig. 4, output of element 460;
wherein the error signal is the output of element 460. Sweitzer does not explicitly state
that the error signal is the difference between the reference error signal and the
extracted noise signal. However, one of ordinary skill in the art can easily show through
simple mathematical operations that the output of element 460 is equal to the difference
between the output of element 470 and the output of the noise predictor), (d) renewing
parameters with reference to the reference error signal and the error signal (page 6,

paragraph 72; wherein renewing the parameters is interpreted as being done by the adaptive filter of the noise predictor), and (e) calculating a difference between the equalized signal and the extracted noise signal, to provide a signal having the noise removed there from (Fig. 4, output of element 430; page 7, paragraph 73, lines 8 - 12).

Therefore it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sweitzer, in the Applicant's prior art system because this would reduce the noise, thereby improving the SNR, as is well known in the art.

Regarding claim 2, Applicant's admitted prior art discloses the demodulating part carries out tuning to a desired channel from received RF (Radio Frequency) signals, converting a RF signal on the tuned channel into an IF (Intermediate Frequency) signal, and demodulating the IF signal in reverse of a VSB modulating method (Fig. 1).

Regarding claim 3, Applicant's admitted prior art discloses the frequency domain equalizing part carries out converting a received time domain signal into the frequency domain signal, equalizing the frequency domain signal, and converting the equalized frequency domain signal into a time domain signal (Fig. 1).

Claim 4 is similarly analyzed as claim 3.

It is noted that the applicant has stated that the operator acts as the subtractor

(specification, page8, paragraph 30) and therefore the examiner has interpreted the

operator as being a subtractor.

Regarding claim 5, Applicant's admitted prior art does not disclose operators and a

filtering unit.

In the same field of endeavor Sweitzer discloses the noise removing part includes:

a first operator for calculating a difference between signals from/to the noise removing

part, to provide a reference error signal (Fig. 4, element 470; page 7, paragraph 73, 1st

4 lines)

a second operator for calculating a difference between the reference error signal and

the extracted noise signal, to provide an error signal (Fig. 4, element 460; page 7,

paragraph 73);

a filtering part for renewing parameters with reference to the reference error signal from

the first operator and the error signal from the second operator, to extract a noise signal

(Fig. 4, element 450; page 6, paragraph 72);

and a third operator for calculating a difference between a signal from the noise

removing part and the noise signal extracted at the filtering part to provide a signal

having the noise removed there from (Fig. 4, element 430; page 6, paragraph 72, last 6

lines).

Therefore it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sweitzer, in the Applicant's prior art system because this would reduce the noise, thereby improving the SNR, as is well known in the art.

It is noted that the applicant has stated that the "deciding part" acts as the slicer (specification, page 8, paragraph 29) and therefore the examiner has interpreted the "deciding part" as being a slicer.

Regarding claim 6, Applicant's prior art does not disclose a "deciding part".

In the same field of endeavor Sweitzer discloses a deciding part between the first operator and the third operator for making decision with reference to a signal from the third operator (Fig. 4, element 420; page 6, paragraph 71; wherein the deciding part is interpreted as the quantizer or slicer and the third operator is the subtractor 430).

Therefore it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sweitzer, in the Applicant's prior art system because this would allow the noisy symbol to be sliced, thereby providing the correct transmitted symbol, as is well known in the art.

Regarding claim 7, Applicant's prior art discloses a VSB receiver (Fig. 1).

The limitation regarding the deciding part being a slicer is as analyzed in claim 6 above.

Regarding claim 11, Applicant's prior art does not disclose that the operators are subtractors or adders.

In the same field of endeavor Sweitzer discloses the first, second, and third operators are subtractors or adders (Fig. 4, elements 470, 460, 430; wherein the 1st, 2nd and 3rd operators are the subtractors 470, 460 and 430 respectively).

Therefore it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sweitzer, in the Applicant's prior art system because this would allow the difference signal or error signal to be computed.

8.   Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Sweitzer et al. (US 20020072879) and further in view of Limberg (US 20010033341).

Regarding claim 8, Applicant's admitted prior art does not disclose delay units.

In the same field of endeavor Limberg discloses a first delay for delaying, and forwarding a signal received at the noise removing part to the first operator, a second delay for delaying, and forwarding a signal from the third operator to the first delay, and a third delay for delaying, and forwarding the noise signal extracted at the filtering part to the second operator (page 6, paragraph 47, last 12 lines; Fig. 8, element 22; wherein the first, second and third delays are interpreted as the compensatory delay 22 that compensates for delays through various elements).

Therefore it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Limberg, in the Applicant's prior art system because this would allow the delay elements to compensate for delays through various elements, as disclosed by Limberg.

9. Claims 9 - 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Sweitzer et al. (US 20020072879) and further in view of Widrow et al. (Adaptive Signal Processing; 1985; Prentice-Hall; pages 99 - 101.

Regarding claim 9, Applicant's admitted prior art does not disclose the LMS algorithm.

In the same field of endeavor Widrow discloses the filtering part is an LMS (Least Mean Square) filter for renewing the parameters by LMS method (page 100, Equation 6.3 and 2 paragraphs from there; page 101, Fig. 6.1).

Therefore it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Widrow, in the Applicant's prior art system because this would allow the coefficients of the adaptive filter to be updated, as is well known in the art.

Claim 10 is similarly analyzed as claim 9, with the LMS equation as shown on page 100, Equation 6.3.

Other Prior Art Cited

10.   The prior art made of record and not relied upon is considered pertinent to the applicant's disclosure.

The following patents are cited to further show the state of the art with respect to VSB systems, frequency domain equalization and noise prediction in equalizers:

Ghosh (US 6,219,379) discloses a VSB receiver with complex equalization for improved multipath performance.

Patel et al. (US 6,313,885) discloses a DTV receiver with baseband equalization filters for QAM signal and for VSB signal which employ common elements.

Perreault (US 4,027,257) discloses a Frequency domain automatic equalizer having logic circuitry.

Perreault (US 4,100,604) discloses a Frequency domain automatic equalizer utilizing the discrete Fourier transform.

Minuhin (US 5,650,954) discloses a frequency and time domain adaptive filtration in a sampled communication channel.

Chevillat et al. (US 5,784,415) discloses a Adaptive noise-predictive partial-response equalization for channels with spectral nulls.

Conclusion

11.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Contact Information

12.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Adolf DSouza whose telephone number is 571-272-

1043. The examiner can normally be reached on Monday through Friday from 8:00 AM.

to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, David Payne can be reached on 571-272-3024. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

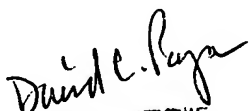published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Adolf DSouza
Examiner
Art Unit 2611

AD

DAVID C. PAYNE
PRIMARY PATENT EXAMINER